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(72) Inventors:
• **Gonen, Gad**
Herzeliya 46301 (IL)
• **Suess, Moti**
Herzeliya 46301 (IL)

(71) Applicant: **FASTBEAT. COM. LIMITED**
GUILFORD, SURREY GU2 5RG (GB)

(74) Representative: **Becker Kurig Straus**
Patentanwälte
Bavariastrasse 7
80336 München (DE)

(54) **Payment method for telephone calls on a prepaid and credit limit basis**

(57) The invention discloses a method for payment of at least a portion of a cost of a telephone call to or from a telephone 105. This method comprises the steps of determining whether a balance of a hybrid account is

greater than zero, balance being the sum of a prepaid amount of the account and a credit line; and if the balance is greater than zero, debiting the hybrid account for the cost of the at least a portion of the telephone call.

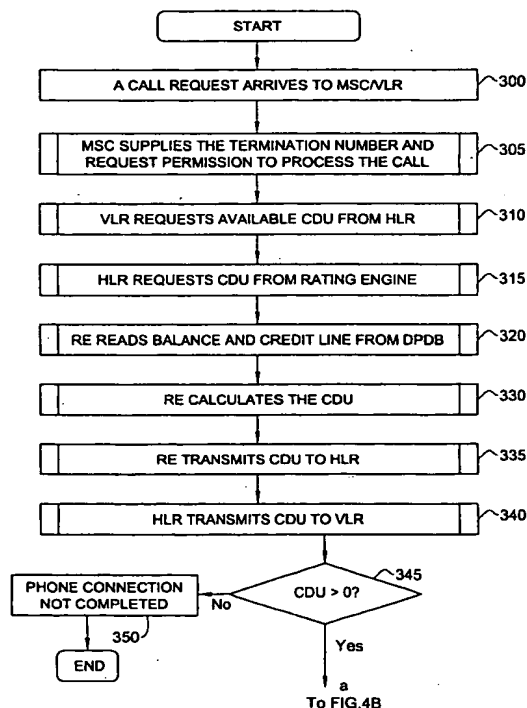


FIG. 4A

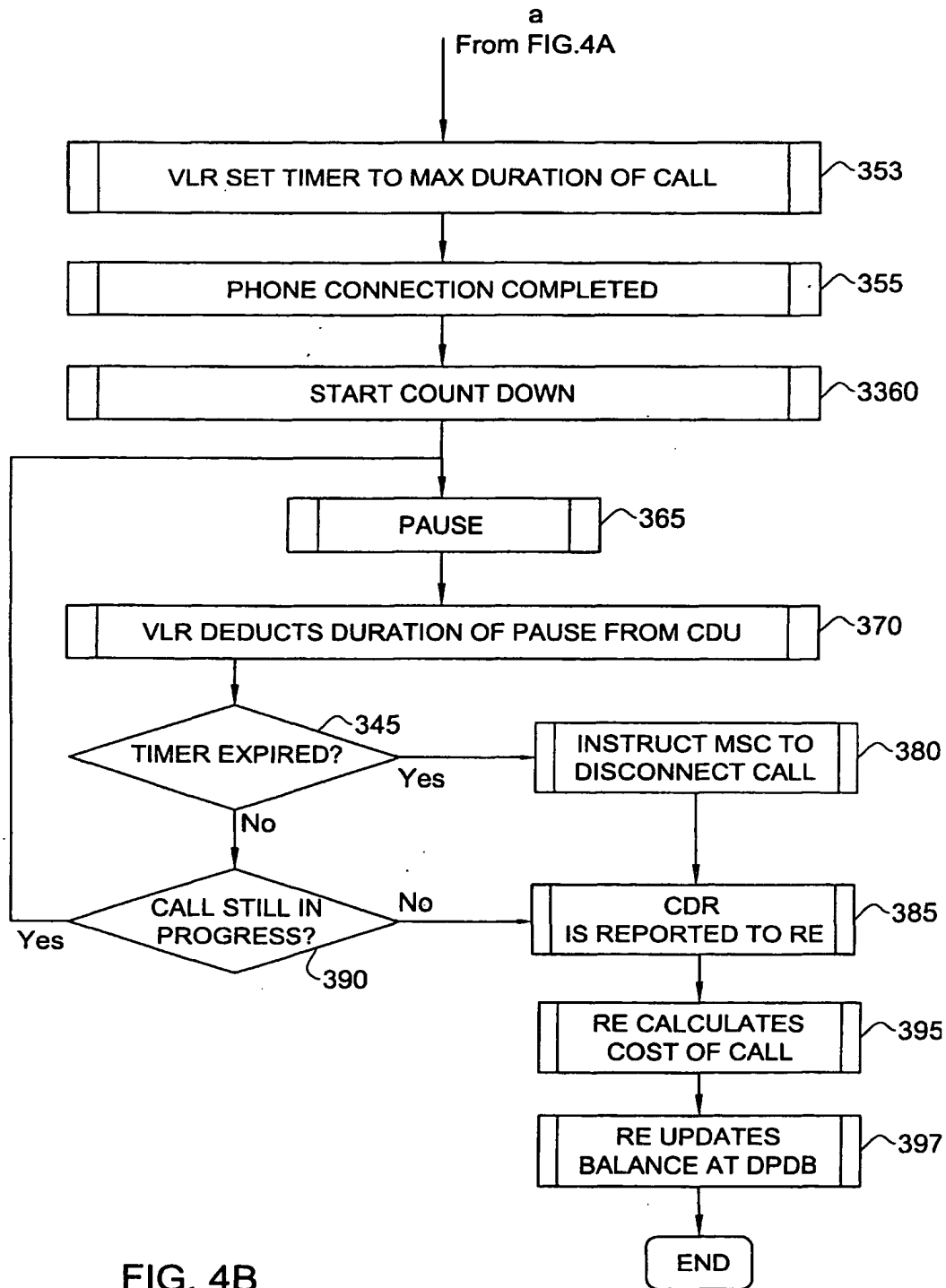


FIG. 4B

Description

FIELD OF THE INVENTION

[0001] The present invention relates to payment methods for telephone calls involving, for example, transmission of voice, data or video and using circuit switched technologies for example, wireline, wireless or packet switched technologies, for example Voice over IP (VoIP).

BACKGROUND OF THE INVENTION

[0002] Users of telephones, whether wired, mobile or VoIP, have an account provided by the telephone service provider. The account allows the user to make and receive telephone calls. The user is periodically billed for outgoing calls and, in the case of a mobile phone, sometimes for incoming calls as well. Most telephone users do not keep track of their use of the telephone, and accordingly receive telephone bills, sometimes much larger than expected.

[0003] In order to assist a user in keeping track of his use of his telephone and for other purposes, prepaid telephone accounts have been devised in which a user pays a sum of money into an account established with the network or a service provider such as a mobile virtual network operator (MVNO). As calls are subsequently made or received by the telephone, the cost of the calls are deducted from the balance of the prepaid account. When the account balance is low, the user pays again into his account. If the user, however, fails to pay in to his account, his service could be cut off in the middle of a telephone call.

SUMMARY OF THE INVENTION

[0004] The present invention provides a system and method for billing telephone use. In accordance with the invention, an account, referred to herein as a "hybrid account", is established for the user, which serves for prepay and for billing. The user pays into the hybrid account. The user is also provided with a line of credit, which together with the recharged amount establishes the amount available for consumption. The available amount ("balance") is updated as phone calls are made. The credit line is normally determined by the system, but the user may apply to have his credit line increased or decreased. Any credit used by the user is periodically billed, for example at the end of every month. user may pay for any used credit in part or in full before being billed.

[0005] The system of the invention includes a Hybrid Account Management Unit (HAMU) that maintains a plurality of hybrid accounts relating to payment for phone calls made or received by users. The HAMU includes a Credit Management Unit (CMU) that allows the user, for example, to establish an account with the sys-

tem and to request a new credit line. The CMU also manages the database tables that hold the user hybrid account details. The HAMU also includes a Recharging Unit (RU) that updates a dual ported real time database (DPDB) with amounts paid by the user into the account and with the credit line as negotiated with the user. The balance as stored in the DPDB may be positive or zero. In accordance with the invention, the balance is zero when all prepaid amount and the credit line are used up. The balance is equal to the credit line when all prepaid is used up, or when a new account is opened and no payments have yet been done. A user is allowed to make phone calls as long as his balance is positive. The Rating Engine (RE) is a device which normally exists in prepaid systems having the function of conversion of currency to Call Duration time Units (CDU). In the hybrid system, the RE may also consider in its calculations, different rates for paid in advanced money and money credited to the user for future billing and payment. The RE shares with the RU access to the DPDB.

[0006] Thus, in its first aspect, the invention provides a method for payment of at least a portion of a cost of a telephone call to or from a telephone, the method being characterized in comprising the steps of:

- (i) determining whether a balance of a hybrid account is greater than zero, balance being the sum of a prepaid amount of the account and a credit line; and
- (ii) if the balance is greater than zero, debiting the hybrid account for the cost of the at least a portion of the telephone call.

[0007] In its second aspect, the invention provides a system for effecting payment of at least a portion of a cost of a telephone call, to or from a telephone, the system being characterized in comprising a Hybrid Account Management Unit configured to carry out the steps of:

- (i) determining whether a balance of a hybrid account is greater than zero, the balance being the sum of a prepaid amount of the account and a credit line; and
- (ii) if the balance is greater than zero, debiting the hybrid account for the cost of the at least a portion of the telephone call.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] In order to understand the invention and to see how it may be carried out in practice, a preferred embodiment will now be described, by way of non-limiting example only, with reference to the accompanying drawings, in which:

Fig. 1 shows a system for payment of telephone calls in accordance with one embodiment of the invention;

Fig. 2 shows an exemplary architecture of the HAMU of the system of Fig. 1;

Fig. 3 shows a flow chart diagram for establishing a hybrid account with the system of Fig. 1; and

Fig. 4 shows a flow chart diagram for monitoring telephone calls.

DETAILED DESCRIPTION OF THE INVENTION

[0009] Fig. 1 shows a wireless telephone system in which a user 100 makes and receives telephone calls with a mobile phone 105 (also known as a cellular phone). The phone 105 communicates with a mobile switching center (MSC) 110 via a base station controller 115 and a transceiver 120. The MSC 110 is one of a plurality of switching centers within a network of mobile telephones. A visiting location register (VLR) 112 associated with the MSC 110 maintains account profile of each mobile phone using the MSC 110 at any time. The MSC 110 communicates with other telephones (not shown) via a public switched telephone network (PTSN) indicated by a cloud 125 that is supported by a signaling system 7 network (SS7) indicated by the cloud 137. A home location register 135 maintains all mobile telephones in the network and communicates with the VLR 112 and with a rating engine 410 over the SS7 network 137. The above described telephone system architecture is typical of the GSM system. This is by way of example only, and other telephone system architectures are contemplated within the scope of the invention

[0010] A database (DPDB) 140 is shared by the rating engine 410 and an HAMU 142. The HAMU 142 maintains a plurality of balances and credit lines relating to phones of users, including the user 100. Fig. 2 shows an exemplary architecture of the HAMU 142. ACMU 405 allows the user, for example, to establish an account with the system, to request a new credit line, to recharge his prepaid account or to pay for used credit. The recharging unit 400 loads data input by the user 100 onto the DPDB 140. The CMU 405 also stores to account database 407, data relating to the various hybrid accounts including the payment method and personal identity information.

[0011] Fig. 3 shows a flow chart diagram for establishing account with the HAMU 142 for payment of telephone calls. In step 200, the user 100 contacts the CMU 405. The user may contact the CMU 405 over the PSTN 125. In this case, the user 100 inputs data to the CMU 405 using interactive voice response (IVR) by depressing keys on the telephone 105. Alternatively, the user 100 may contact the CMU 405 over the Internet or by short message service (SMS) (not shown).

[0012] In step 205, the user is prompted by the CMU 405 to provide personal information relating to himself and to the telephone 105 to which the account relates. In step 207, the user provides the requested information. In step 210, the CMU 400 determines a credit line for the user 100. The CMU 405 may authorize a finite or infinite credit line. In step 215 the user is informed of

the credit line that the CMU 405 has determined. In step 220, the user is asked if he prefers a lower credit line than the credit line that was determined by the CMU 405. If the user responds in the affirmative, then the user is instructed to input the desired credit line (step 225). Once the final credit line has been established, the user can choose to exit and immediately benefit from the credit by making calls. As he can also charge his phone account and use prepaid money, he is prompted to make a deposit to the prepaid account (step 230). If he chooses to prepay (step 231) then in step 232, the deposit is made. The deposit is most conveniently made by the user providing a credit card number and specifying an amount to be deposited. After the transaction is completed when the credit card clearing house approves the transfer of funds (step 233) the recharging unit 400 updates the balance of the DPDB.

[0013] Fig. 4 shows a process for monitoring telephone calls from or to the telephone 105. The process is carried out during a telephone call between the user 100 and another user (not shown). In step 300, a call request arrives from the originating telephone 105 to the MSC. In step 305, the MSC informs the VLR 112 of the call request including the destination telephone number. In step 310 the VLR 112 requests from the HLR the number of Call Duration time Units (CDU) available to the caller. In step 315, the HLR 135 contacts the rating engine 410 and asks for the number of airtime units available to the caller considering the specific destination number. In step 320 the RE checks the balance and the CL with the DPDB 140. In step 330, the rating engine 410 calculates from the balance the number of CDU available to the caller. The calculation is based on time of day rating, the specified destination of call, possible different rating for prepaid money and for credited money. In step 335, the number of available CDU is transmitted to the HLR 135. In step 340 the HLR 135 transmits the number of available CDU to the VLR 112.

[0014] In step 345 the VLR 112 determines whether the number of CDU is greater than 0. (If the Credit Line is infinite, then the number of CDU is always greater than 0 irrespective of the number of CDU that have been used). If in step 345 it is determined that the number of CDU is not greater than 0, a phone connection is not completed (step 350) and the process terminates. If yes, then in step 353 the VLR 112 sets a timer to the maximum allowed call duration, and step 355 the VLR 112 instructs the MSC 110 to complete a phone connection between the caller and the destination telephone. In step 360, the timer begins to time the duration of the phone connection. In step 365 the system pauses, for example for 10 seconds. In step 370 the VLR 112 deducts the duration of the pause from the number of available airtime. In step 375 it is determined whether the amount of remaining airtime is greater than 0. If no, then in step 380 the VLR 112 instructs the MSC 110 to disconnect the call, and the process proceeds to step 385. If yes, then in step 390 the VLR 112 determines whether

the call is still in progress. If yes, the process returns to step 365. If no, the process proceeds to step 385.

[0015] In step 385, a CDR is prepared and reported back to the rating engine. In step 395, the rating engine (acting as a billing system) calculates the cost of the phone call. In step 397, the rating engine decrements the balance with the cost of the call, and the process terminates.

[0016] The user is periodically billed. For example, the CMU 405 may check the balance of the account once in a month. If the balance shows a use of credit, the user is billed for the difference between the credit line and the balance. After payment, the account is recharged to show an amount equal to the credit line.

Claims

1. A method for payment of at least a portion of a cost of a telephone call to or from a telephone (105), the method being **characterized in** comprising the steps of:

(I) determining whether a balance of a hybrid account is greater than zero, balance being the sum of a prepaid amount of the account and a credit line; and

(II) if the balance is greater than zero, debiting the hybrid account for the cost of the at least a portion of the telephone call.

2. The method of Claim 1 wherein the telephone 105 is a mobile telephone.

3. The method according to any one of the previous claims further comprising a step of billing the individual when the balance is less than the credit line for an amount equal to the difference between the credit line and the balance.

4. The method according to Claim 3 wherein the step of billing the individual occurs once in a predetermined time period.

5. The method according to any one of the previous claims further comprising a step of depositing funds into the hybrid account.

6. The method according to any one of the previous claims wherein the Credit Line is infinite.

7. A system for effecting payment of at least a portion of a cost of a telephone call to or from a telephone (105), the system being **characterized in** comprising a Hybrid Account Management Unit (142) configured to carry out the steps of:

(I) determining whether a balance of a hybrid

account is greater than zero, the balance being the sum of a prepaid amount of the account and a credit line; and

(II) if the balance is greater than zero, debiting the hybrid account for the cost of the at least a portion of the telephone call.

8. The system of Claim 7 wherein the telephone (105) is a mobile phone.

9. The system of Claim 7 or 8 wherein the Hybrid Account Management Unit (140) is further configured to:

(i) determine whether the balance is less than the credit line; and

(ii) if the balance is less than the credit line, bill the user for an amount equal to the difference between the credit line and the balance.

10. The system of Claim 9 wherein billing of the individual occurs once in a predetermined time period.

11. The system according to any one of claims 7 to 10 wherein the Credit Line is infinite.

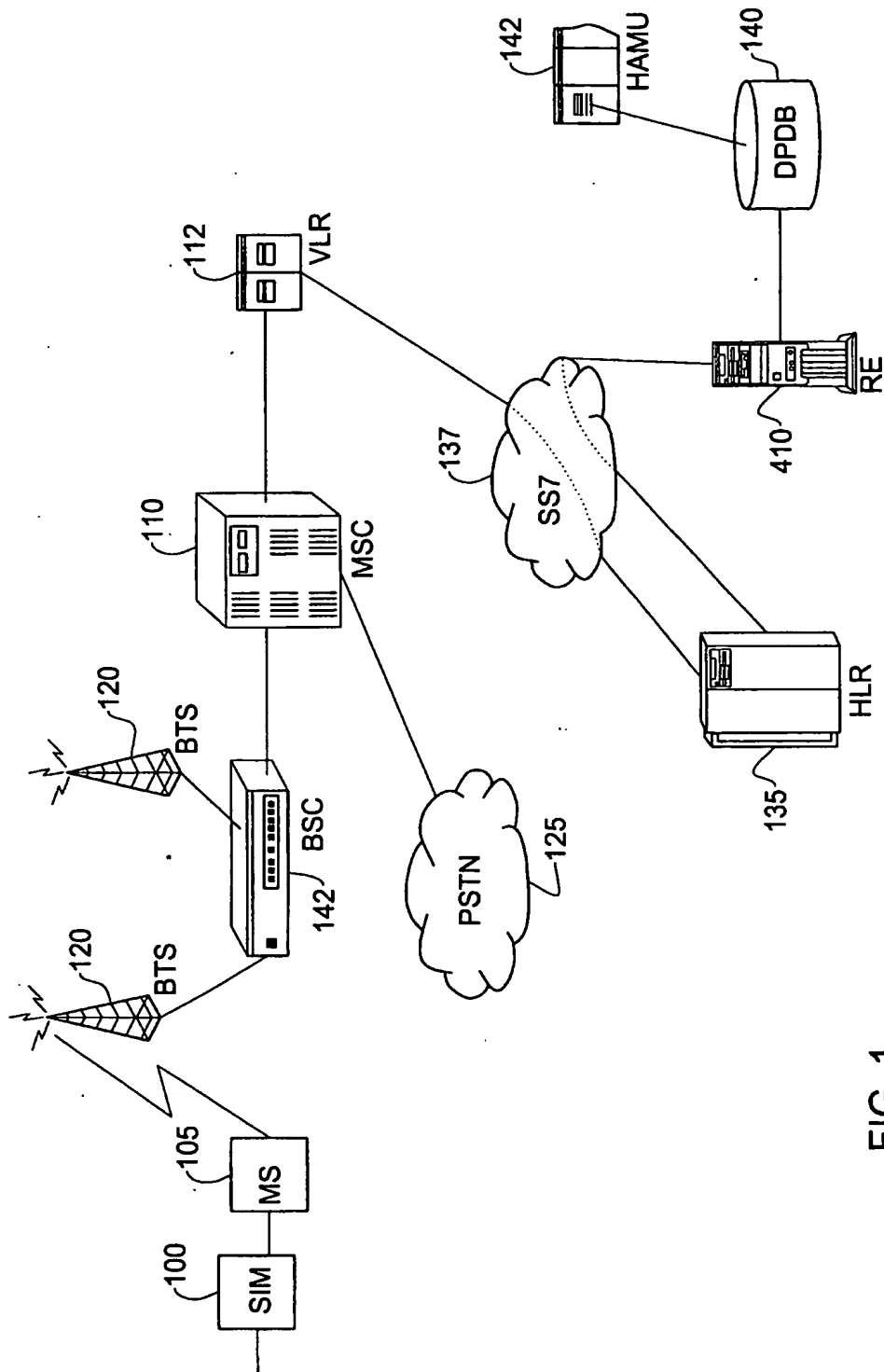


FIG. 1

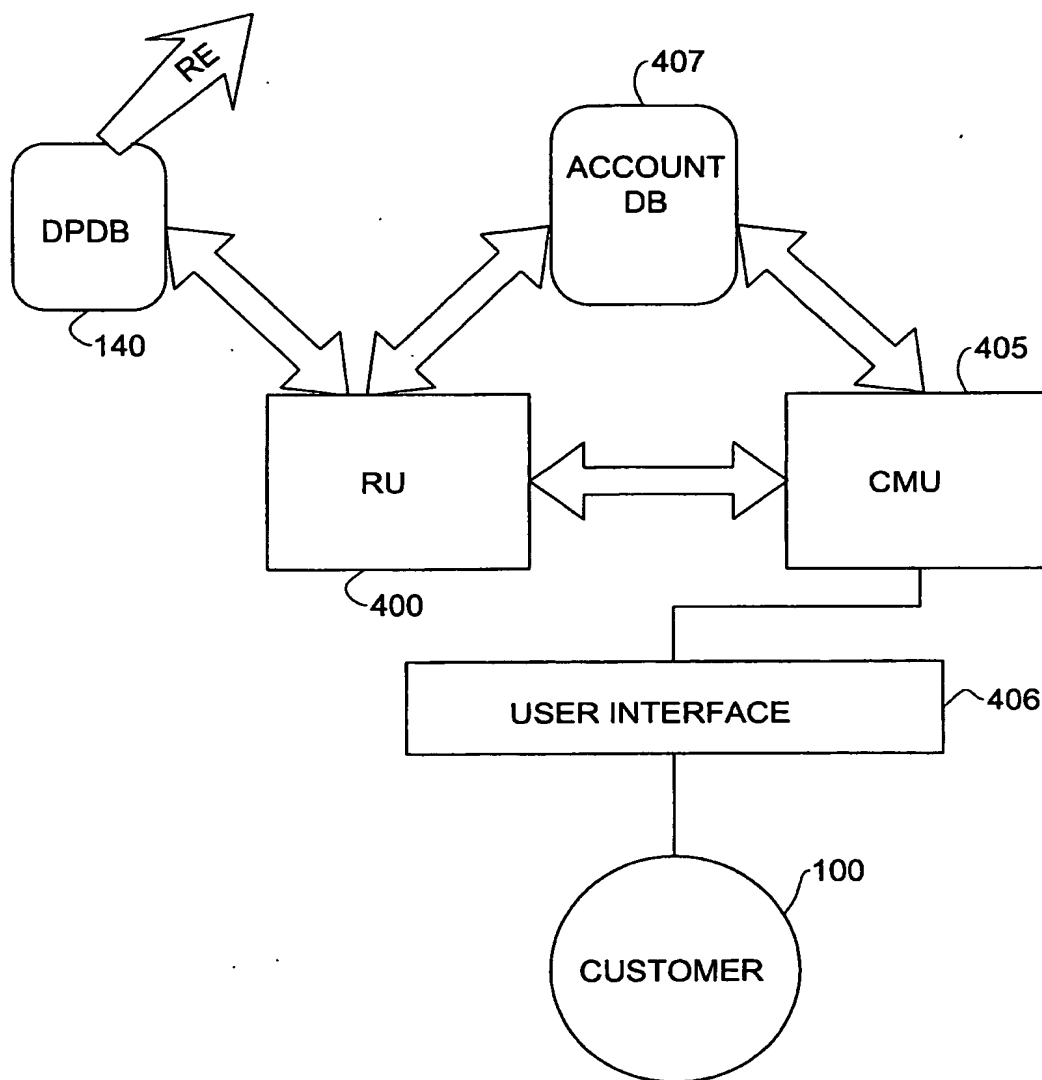


FIG. 2

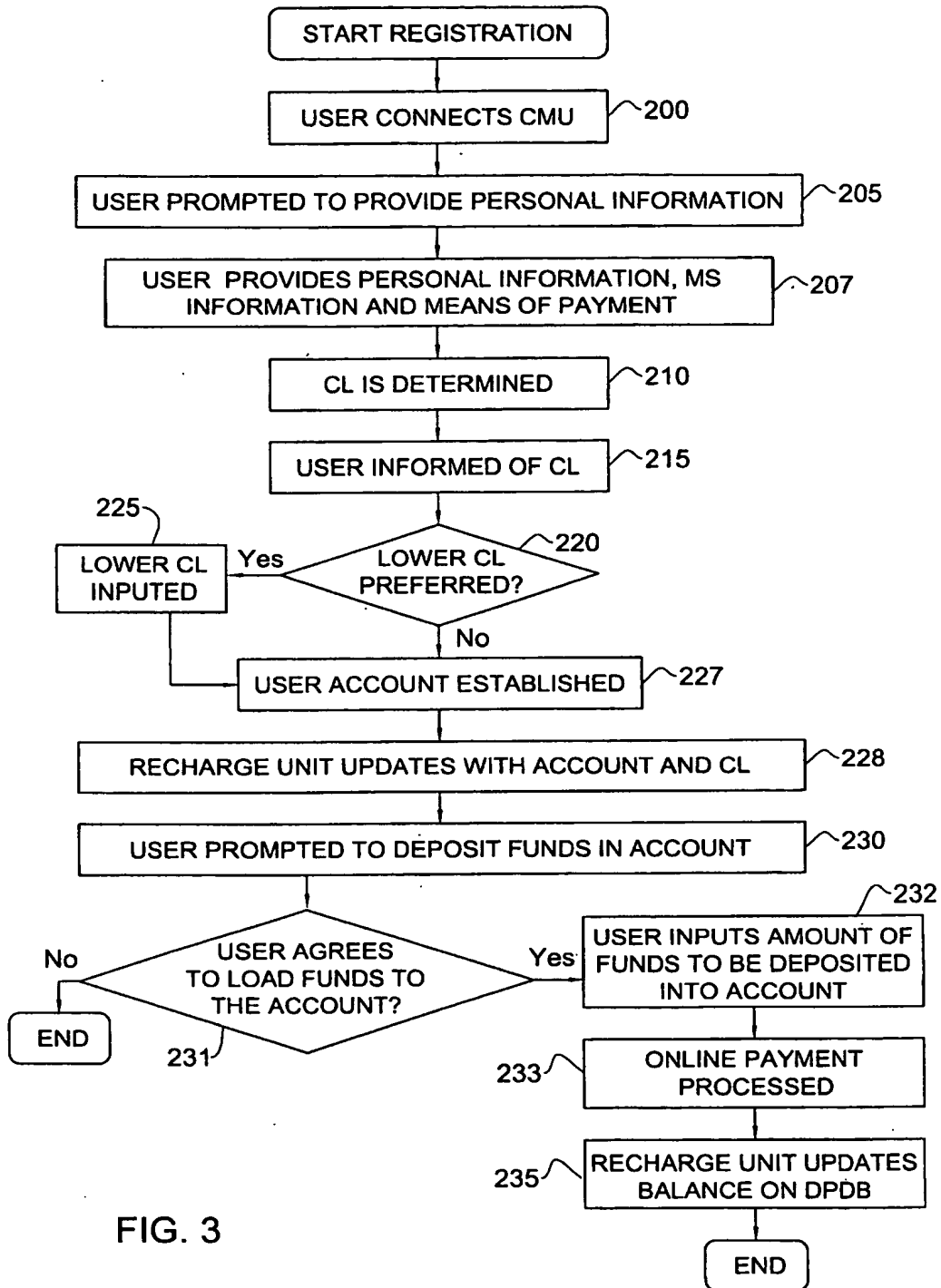


FIG. 3

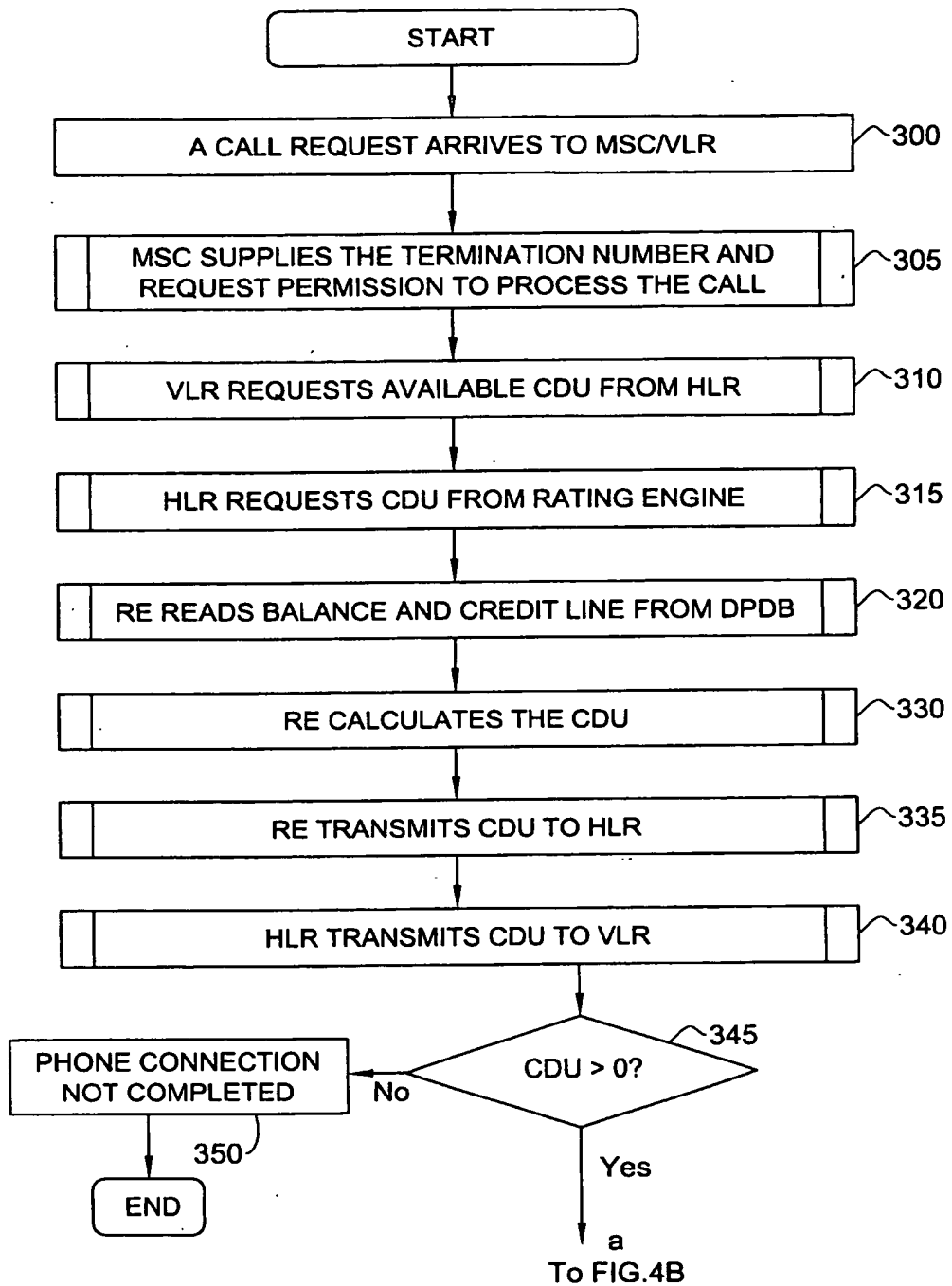
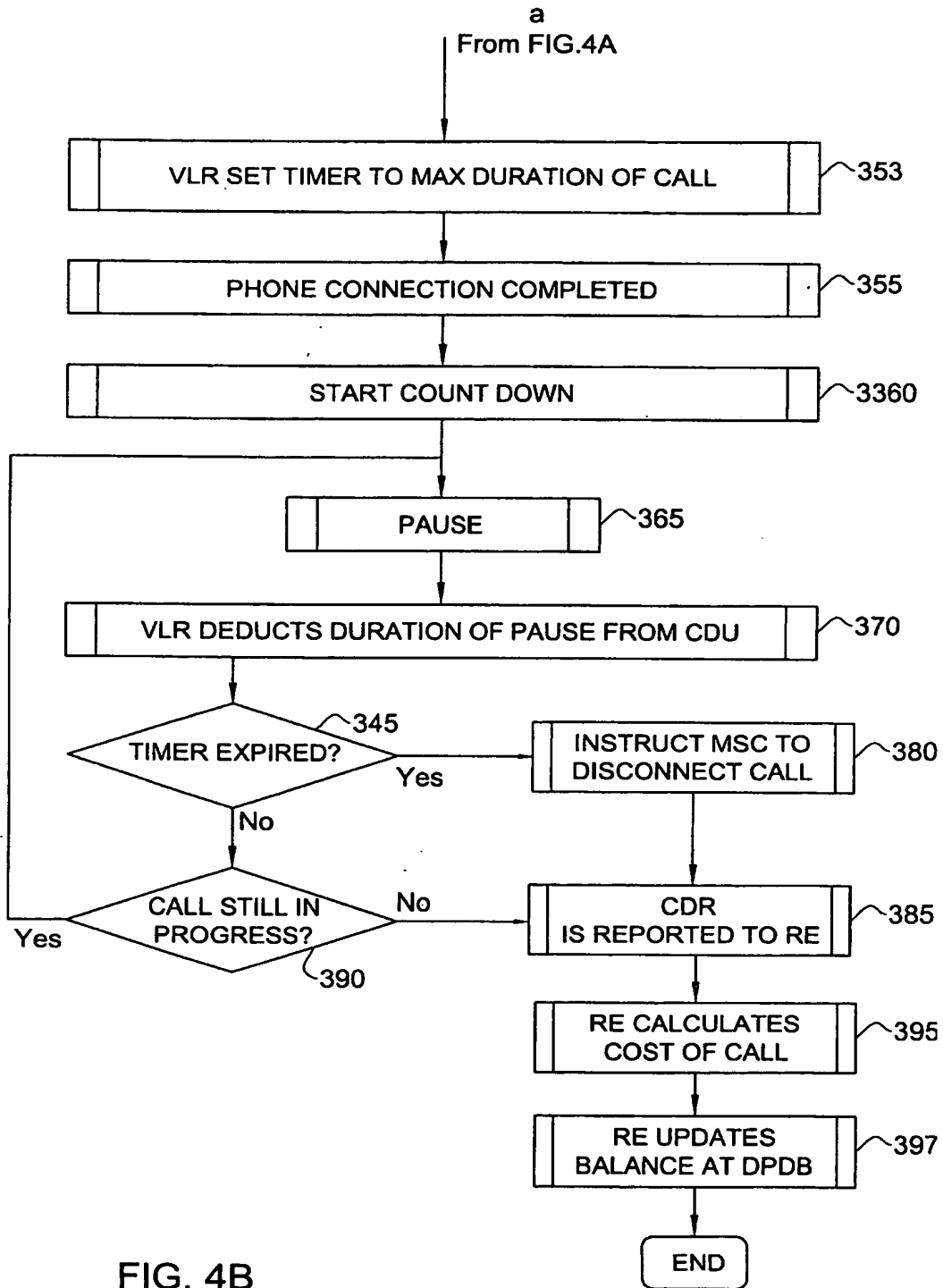


FIG. 4A





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EUROPEAN SEARCH REPORT

Application Number
EP 01 11 1683

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 6 226 364 B1 (O'NEIL DOUGLAS R) 1 May 2001 (2001-05-01) * abstract; figures 1,4,6,7 * * column 1, line 26 - column 2, line 14 * * column 4, line 19 - line 65 * * column 5, line 63 - column 6, line 28 * * column 9, line 29 - column 10, line 22 * * column 14, line 46 - column 15, line 52 * ---	1-11	H04M17/00
X	US 6 070 067 A (OLVERA-HERNANDEZ ULISES ET AL) 30 May 2000 (2000-05-30) * column 2, line 49 - column 5, line 9 * * figures 1,2 * ---	1-11	
X	EP 0 540 234 A (AMERICAN TELEPHONE & TELEGRAPH) 5 May 1993 (1993-05-05) * abstract * * column 3, line 55 - column 7, line 23 * -----	1,3-7, 9-11	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7)
			H04M
The present search report has been drawn up for all claims			
Place of search MUNICH		Date of completion of the search 12 October 2001	Examiner Nash, M
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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